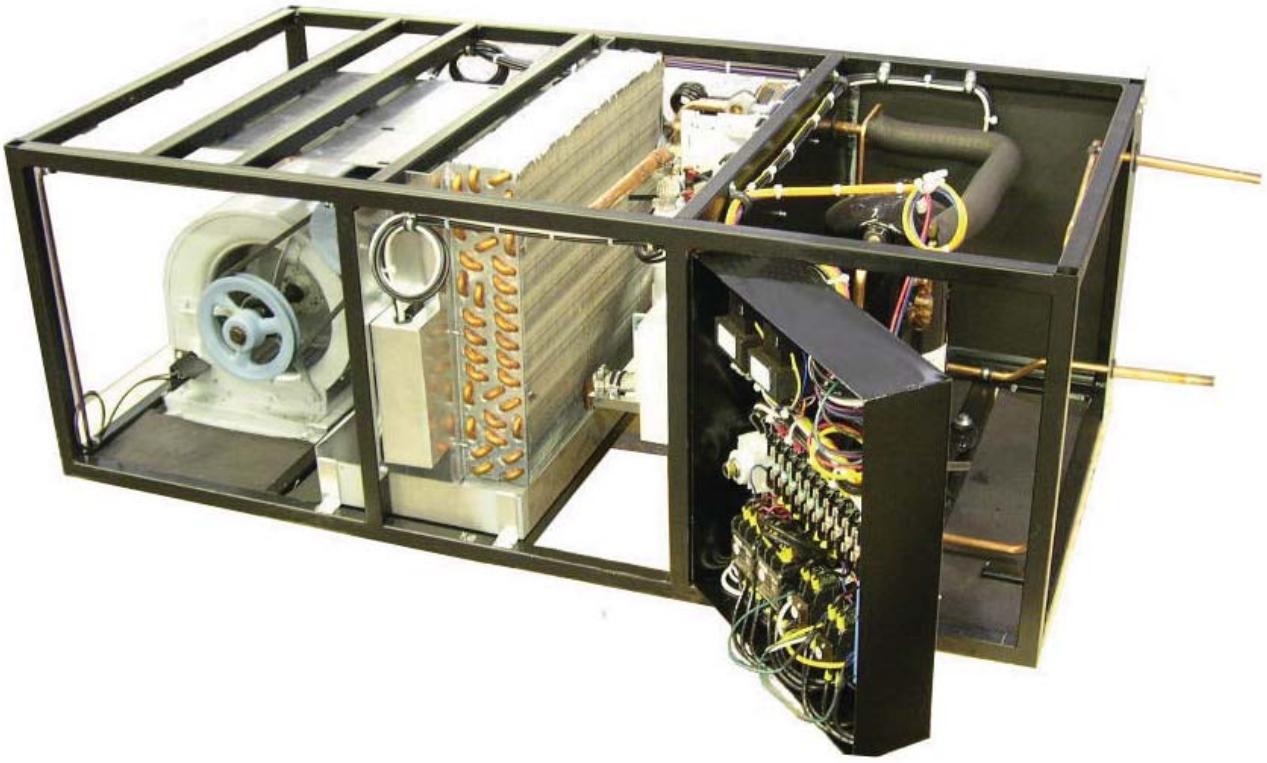
DATA AIRE INC.

MINI CEILING SERIES

Installation, Operation and Maintenance Manual

1, 1.5, 2 and 2.5 ton

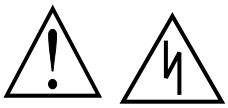


Air, Water and Glycol Cooled DX and Chilled Water

CONGRATULATIONS ON THE SELECTION OF A DATA AIRE PRECISION ENVIRONMENTAL CONTROL SYSTEM. PROPER INSTALLATION, OPERATION AND MAINTENANCE OF THIS EQUIPMENT WILL ENSURE YEARS OF OPTIMAL PERFORMANCE.

This manual is intended to assist trained service personnel by providing necessary guidelines for this particular equipment. Service to Data Aire units should be done by qualified individuals with an adequate background in areas such as HVAC, electrical, plumbing and electronics, as applicable.

Service performed by unauthorized or unqualified technicians may void manufacturers' warranties and could result in property damage and/or personal injury.



Special care should be given to those areas where these symbols appear.

Data Aire, Inc. reserves the right to make design changes for the purposes of product improvement, or to withdraw any design without notice.

Table of Contents

1.0 INSTALLATION 6
1.1 Room Considerations 6
1.2 Inspection 6
1.3 Locating the Unit 6
1.3.1 Vertical Airflow Units 7
1.3.2 Air Cooled Package Units 7
1.3.3 Horizontal Airflow Units 8
1.3.4 Indoor Condensers & Condensing Units 8
1.4 Paperwork 8
1.5 Storage 8
2.0 PIPING 10
2.1 Split Air Cooled Unit Piping 10
2.1.1 Discharge Lines 10
2.1.2 Liquid Lines 10
2.1.3 Suction Lines 10
2.1.4 Connection Sizes, Air Cooled Units 10
2.1.5 Field Piping, Remote Condenser 11
2.1.6 Field Piping, Remote Condensing Unit 11
2.2 Water/Glycol Cooled Unit Piping 12
2.2.1 Connection Sizes, Water/Glycol Cooled Units 13
2.2.2 Connection Sizes, Fluid Coolers 13
2.3 Auxiliary Chilled Water Coil Piping 13
2.4 Condensate Drain Piping 13
2.5 Humidifier Piping 14
2.6 Leak Testing 14
2.7 Evacuation 14

3.0 ELECTRICAL CONNECTIONS 15
3.1 Electrical Service 15
3.2 Nameplate Ratings 15
3.3 Grounding 15
3.4 Voltage Tolerance 15
3.5 Auxiliary Control Wiring 15
3.6 Remote 16
3.7 Remote Alarm Contacts 16
3.7.1 Mini DAP™ II 16
3.7.2 Mini DAP III 16
3.8 Remote Sensors 16
3.8.1 Mini DAP II 16
3.8.2 Mini DAP III 16
3.9 Condensate Pumps 16

4.0 INSTALLATION OF REMOTE OUTDOOR HEAT EXCHANGER 17
4.1 Rigging 17
4.2 Leg Assembly 17
4.3 Locating the Remote Heat Exchanger 17

Table of Contents, continued

4.0 INSTALLATION OF REMOTE OUTDOOR HEAT EXCHANGER - *Continued*
4.4 Electrical Service 18
4.5 Air Cooled Condensers - Model DARC 18
4.6 Fluid Coolers - Model DAFC 18
4.6.1 Fluid-Sensing Thermostats 18
4.6.2 Energy Saver Cooling 18

5.0 CHARGING 19
5.1 Air Cooled Systems 19
5.1.1 Package Air Cooled Systems 19
5.1.2 Split Indoor Air Cooled Systems Charging 19
5.1.3 Fan Speed Control System Charging 20
5.1.4 Flooded System Charging 21
5.2 Water/Glycol Cooled Systems 22
5.2.1 Water/Glycol Cooled Systems Charging 22
5.2.2 Factory Charge for Water/Glycol Cooled Systems 22
5.3 Refrigerant Handling 22
5.4 Important Refrigeration Component 23
5.4.1 Expansion Valve 23
5.4.2 High Pressure Cutout Switch 23
5.4.3 Low Pressure Cutout Switch 23

6.0 GLYCOL SYSTEMS 24
6.1 Glycol Concentration 24
6.2 Internal (Fluid) Volume 24
6.3 Fluid Cooler Internal Volume 24
6.4 Copper Piping Internal Volume 24
6.5 Freezing Point of Aqueous Solutions 24

7.0 CONTROLS 25
7.1 Standard Thermostat 25
7.2 Optional Programmable Thermostat 25
7.3 Optional Mini DAP II Microprocessor Control Panel 25
7.4 Optional DAP II Microprocessor Control Panel 25
7.5 Secondary Heat Exchangers 25
7.6 Wiring Diagrams 26

8.0 REGULAR MAINTENANCE ITEMS
8.1 Air Filters 27
8.2 Belts 27
8.3 Bearings 27
8.4 Humidifier Canisters 27
8.5 Fuses 27
8.6 Heating Elements 27
8.7 Refrigerant Filter Drier 28

Table of Contents, continued

9.0 WARRANTY 29

10.0 CONTACT DATA AIRE 30

LINE SIZING CHART 31

Monthly Maintenance Inspection Checklist 32

Quarterly Maintenance Inspection Checklist 33

Superheat and Suction Pressure Troubleshooting Guide 34

Temperature Pressure Chart 35

INDEX 36,37

1.0 INSTALLATION

There is no intent on the part of Data Aire, Inc. to define local codes or statutes which may supercede common trade practices. The manufacturer assumes no responsibility for their interpretation. Consult local building codes and the National Electrical Code for special installation requirements.

1.1 Room Considerations

Precision air conditioning equipment is designed to control spaces within close tolerances of temperature and humidity. However, the room must be built with a proper vapor barrier. A film of polyethylene is often used on walls and ceilings or walls and floors must also be painted with a vapor-seal paint. All doors to the controlled space should be equipped with weather seals to prevent the infiltration of non-neutral conditioned air from entering the space. Failure to provide a vapor barrier can compromise the ability to control space conditions.

Introduction of outside air into the controlled space should be minimized. Outside air in excess of 5% of the total circulated air volume can have a significant effect on the overall space conditions and result in poor space control. All outside air that is introduced should be conditioned to the humidity and temperature parameters of the computer room air conditioner (CRAC) unit set points to maintain proper room conditions and to prevent the CRAC units from running excessively to maintain the room's conditions.

1.2 Inspection

This Data Aire unit has been factory run-tested and has gone through a comprehensive inspection prior to its packaging and shipment to ensure that it arrives in excellent condition. However, shipping damage can occur and a visual inspection of the outer crating immediately upon delivery should be performed.

Note any external damage or other transportation damage on the freight carrier's forms. Inspect the unit itself for internal damage. A claim should be filed with the shipping company if the equipment is damaged or incomplete.

Loose items such as remote control panels, disconnect switch handles, spare belts and spare filters are packed inside the unit. Refer to the yellow shipping tag located on the unit door for details.

Freight damage claims are the responsibility of the purchaser. Action to recover losses should be filed immediately. Please notify factory personnel of any claims.

1.3 Locating the Unit

The unit is intended for above the ceiling installation and is typically suspended from structural members in the building above the ceiling. Add a 50% safety factor to the weight of the unit to determine the strength of the supporting structural members.

Appropriate service access above the ceiling is required around all service and electrical access panels. There must be unobstructed clearance below the unit allowing ladder access to enable routine maintenance and service.

Note there are many available unit configurations for Mini Ceiling systems. Be sure to identify the unit type and style before installing. For instance there may be split condenser/ condensing sections requiring separate or shared power.

Note to Installing Contractor: Condensation formation and frequent humidifier flushing are normal functions of this equipment. Proper drain connections must be made to ensure proper removal. Unit will require water connections for condensate removal and possibly for humidifier make-up water, condenser water, chilled water and/or hot water. Installation of units above equipment that could sustain water damage should be avoided.

1.3.1 Vertical Airflow Units

The evaporator (cooling) section is typically mounted over a standard 2' x 4' T-bar ceiling grid, supported by four threaded rods. The evaporator (cooling) section will be referred to as the evaporator section from here on even though the coil on chilled water units is not a true evaporator coil.

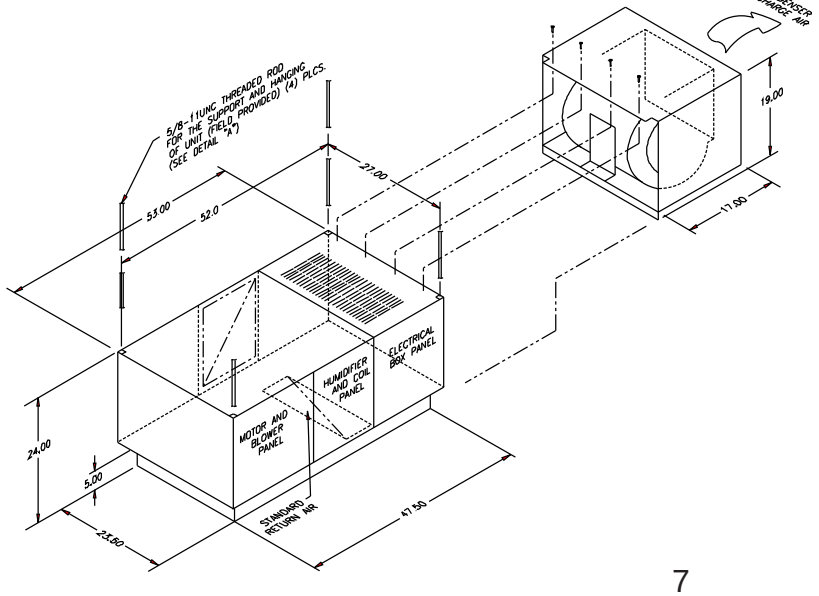
Four threaded support rods must be securely attached to the building structure. Raise the evaporator section with an appropriate lifting device. Attach washers, nuts and jam nuts to each threaded rod. Tighten the nuts so the weight is supported evenly by the four rods and the unit is level. Be sure to allow for the depth of the Supply/Return air plenum when calculating the height of the unit above the ceiling.

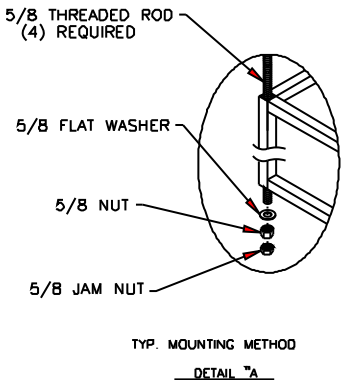
The 5" tall vertical Supply/Return plenum assembly is attached to the bottom of the evaporator section after the evaporator section has been hung. Six screws fasten the plenum to the evaporator section. The Supply/Return air grilles should be temporarily removed for access. The plenum mounts flush to the ceiling grid.

1.3.2 Air Cooled Packaged Units

Air cooled package units require an additional condenser fan section to be mounted to the end of the evaporator section at the condenser coil. Place a gasket around the perimeter of the condenser coil opening. Connect the female motor plug from the condenser blower section to the male plug inside the evaporator section. Attach the condenser blower section using four (4) self-drilling #10 self drilling sheet metal screws.

UNIT MOUNTING METHOD & CONDENSER INSTALLATION





TYP. MOUNTING METHOD
DETAIL "A"

Most applications will allow for the condenser discharge air to blow out into the ceiling space and no ducting is required. The ceiling space must be large enough to dissipate the rejected heat. Plenum space temperature should not exceed 95° F. If ducting is required the additional static imposed by ductwork on the air intake and/or discharge should not exceed 0.3". In some applications a factory provided low ambient damper is used at the condenser air intake. The air intake is modified from its normal grilled openings to a single 15" x 17" duct collar.

1.3.3 Horizontal Airflow Units

Ductwork is connected to factory provided duct collars on the supply and return air openings. Four threaded support rods must be securely attached to the building structure. Raise the evaporator section with an appropriate lifting device. Attach washers, nuts and jam nuts to each threaded rod. Tighten the nuts so the weight is supported evenly by the four rods and the unit is level.

Note some options call for a combination of vertical and horizontal airflow configuration. In that case, the 5" plenum assembly described above is necessary.

1.3.4 Indoor Condensers and Condensing Units

These sections are to be mounted in the same manner as the evaporator sections using four threaded rods. Air cooled condensers or condensing units have factory provided duct collars on the supply and intake air openings as appropriate. Water cooled condensing sections have no airflow connections.

Typical installations have the condenser or condensing section physically near the evaporator, especially since most have shared electrical line power. The mounting of these sections is independent of the evaporator mounting. The same service and maintenance clearance requirements apply to these units as well.

1.4 Paperwork

Each Data Aire unit ships with a start-up sheet that should be completed during installation. Also included in the paperwork is a warranty/information packet that provides important wiring diagrams, specific component literature, warranty registrations cards and other valuable paperwork, including a copy of this Installation/Operation and Maintenance manual.

A yellow tag is attached to the outside panel to indicate articles that may have been packaged and shipped loose within the unit cabinet. Typically this would be a condensate pump and other loose components that are not factory mounted.

It is the responsibility of the installing contractor to return the start-up sheet and warranty registration card to Data Aire for proper activation of the unit warranty. Failure to do so may cause delays and in some cases void the warranty.

1.5 Storage

Your Data Aire equipment comes ready for immediate installation. In some instances it may be necessary to store the equipment for a period of time. If you must store the equipment it should be done in a dry area, out of the weather, protected from freezing temperatures, protected from damage by other equipment in storage or transportation equipment, never stacked, and avoid frequent relocation.

If equipment is stored for longer than 30 days special precautions must be taken to avoid coil damage. All coils should be charged and sealed with a low pressure (1-3 psig) inert gas, such as nitrogen. This prevents contaminates from entering the coils; then when the seal is broken at installation, the rush of escaping gas verifies the coil is still leak free. If coils are not charged and sealed condensation mixes with air pollutants forming a weak acid and over time can cause pin hole leaks to develop in the coil tubes.

When equipment is installed after storage caution should be taken to inspect and replace, if required, rubber hoses and belts. All moving parts, such as blowers and motors, should be hand tested to ensure that they are free and clear prior to start-up. Finally, verify that all lubrication is fresh and full.

It is the responsibility of the installing contractor to return the start-up sheet and warranty registration card to Data Aire for proper activation of the unit warranty. Failure to do so may cause delays and in some cases void the warranty.

2.0 PIPING

2.1 Split Air Cooled Unit Piping

Refer to the attached Line Sizing chart on page 31 for a guideline for sizing refrigerant lines. The ultimate responsibility for line size selection is that of the installing contractor or project engineer. Data Aire does not assume this responsibility. The chart covers distances up to 200 equivalent feet. For installations beyond this distance, consult ASHRAE or similar references.

Standard Piping practice must be used to ensure proper oil return and efficient operation. The interconnecting lines to the remote air cooled condenser must be installed by a qualified refrigeration mechanic.

2.1.1 Discharge Lines

Discharge lines, also called Hot Gas lines, should be trapped at the top (inverted) and bottom, as well as every 20 feet of vertical rise. Discharge line check valves are recommended on all installations, especially those where there are long pipe runs or cold climate. Check valves should be installed six feet from the compressor.

Discharge line pressure drop should not exceed 6 PSI. Recommended gas velocity for proper oil return is 1,000 FPM. Slope horizontal lines downward in the direction of refrigerant flow 1/2" for every ten feet of line length.

2.1.2 Liquid Lines

Liquid line size is determined by pressure drop and velocity. The liquid line pressure drop should be not exceed 5 PSI. The recommended velocity should be between 200 and 300 FPM.
To avoid excessive liquid line pressure drop, the air cooled condenser should be located above or at the same level as the evaporator. Condenser installation more than ten feet below the evaporator should be avoided.

2.1.3 Suction Lines

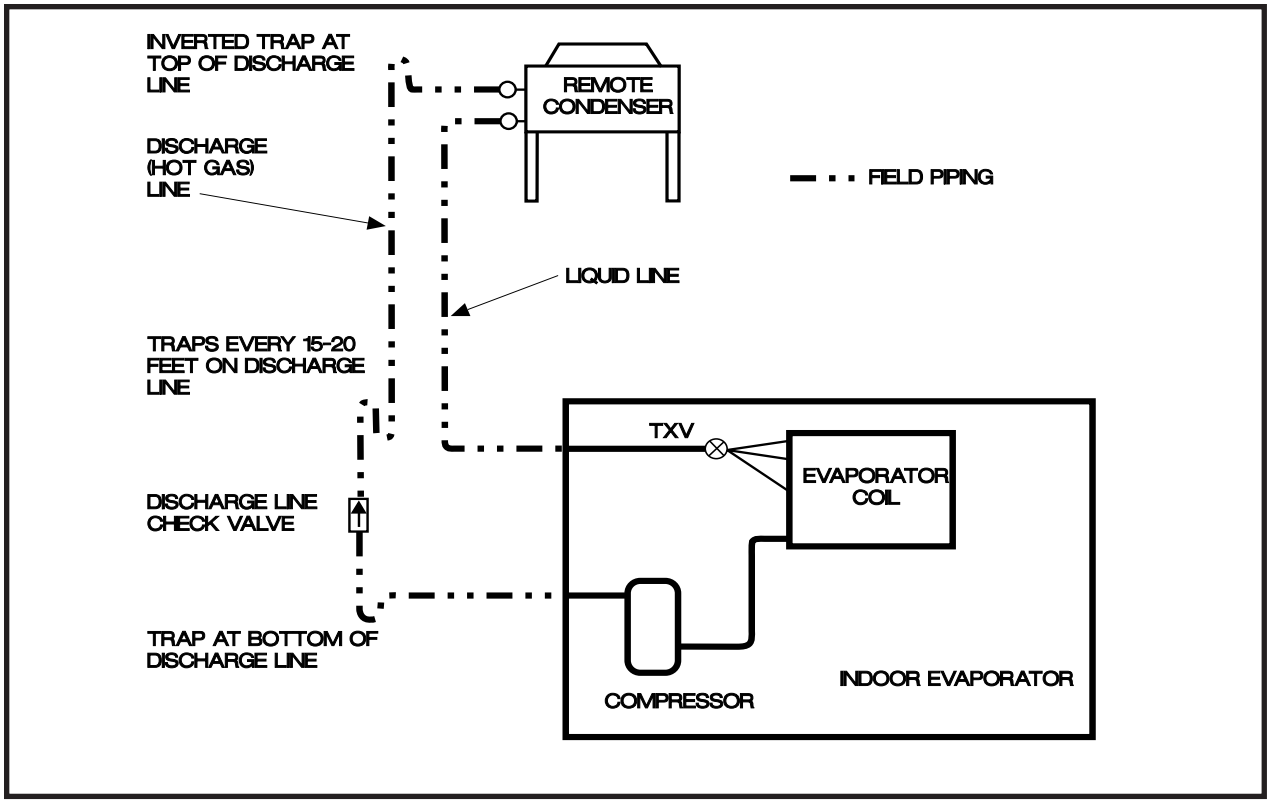
Some applications call for the compressor to be mounted in the outdoor condenser, or condensing unit. Such cases require field piping of liquid and suction lines. Suction lines are trapped similarly to discharge lines except for the inverted trap at the top of the suction line and the line needs to be insulated with a minimum 1/2" thick insulation or per code. Common practice for suction line selection, see page 31, and installation should be followed.

2.1.4 Connection Sizes, Air Cooled Units

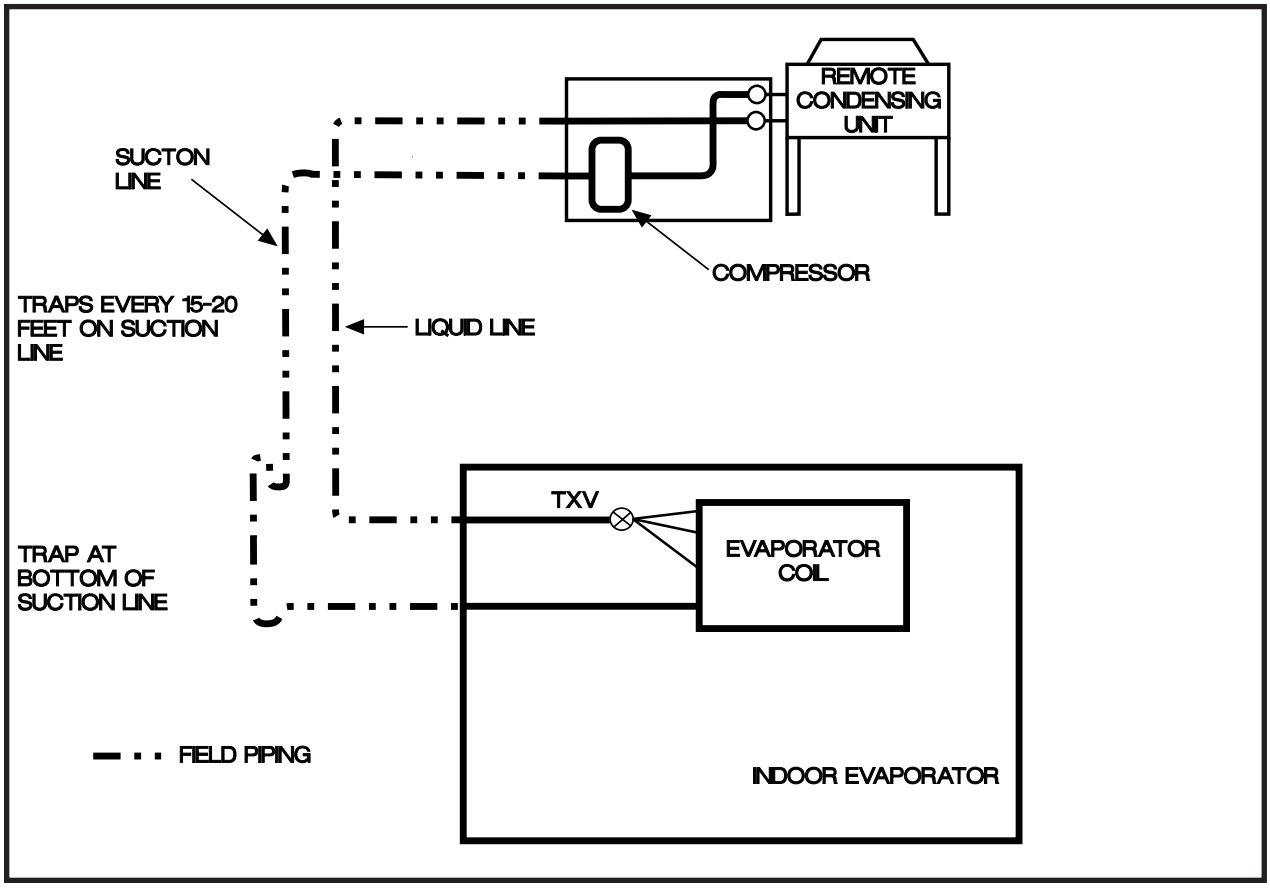
Model	Hot Gas	Liquid	Suction	
DAMA 0112	1/2"	1/2"	3/4"	Note: Unit will have a Liquid Line and
DAMA 1.512	1/2"	1/2"	3/4"	either a Hot Gas or Suction Line
DAMA 0212	1/2"	1/2"	3/4"	
DAMA 2.512	1/2"	1/2"	3/4"	

Field connections at the indoor evaporator and remote condenser or condensing unit will not necessarily be the same as the field pipe size required. In some cases these will

2.1.5 Field Piping, Remote Condenser



2.1.6 Field Piping, Remote Condensing Unit



2.2 Water/Glycol Cooled Unit Piping

The required field installed condenser water pipe sizes may or may not be the same as the connection sizes at the evaporator or fluid cooler. This will depend on the length of pipe and the calculated pressure drop of peripheral components.

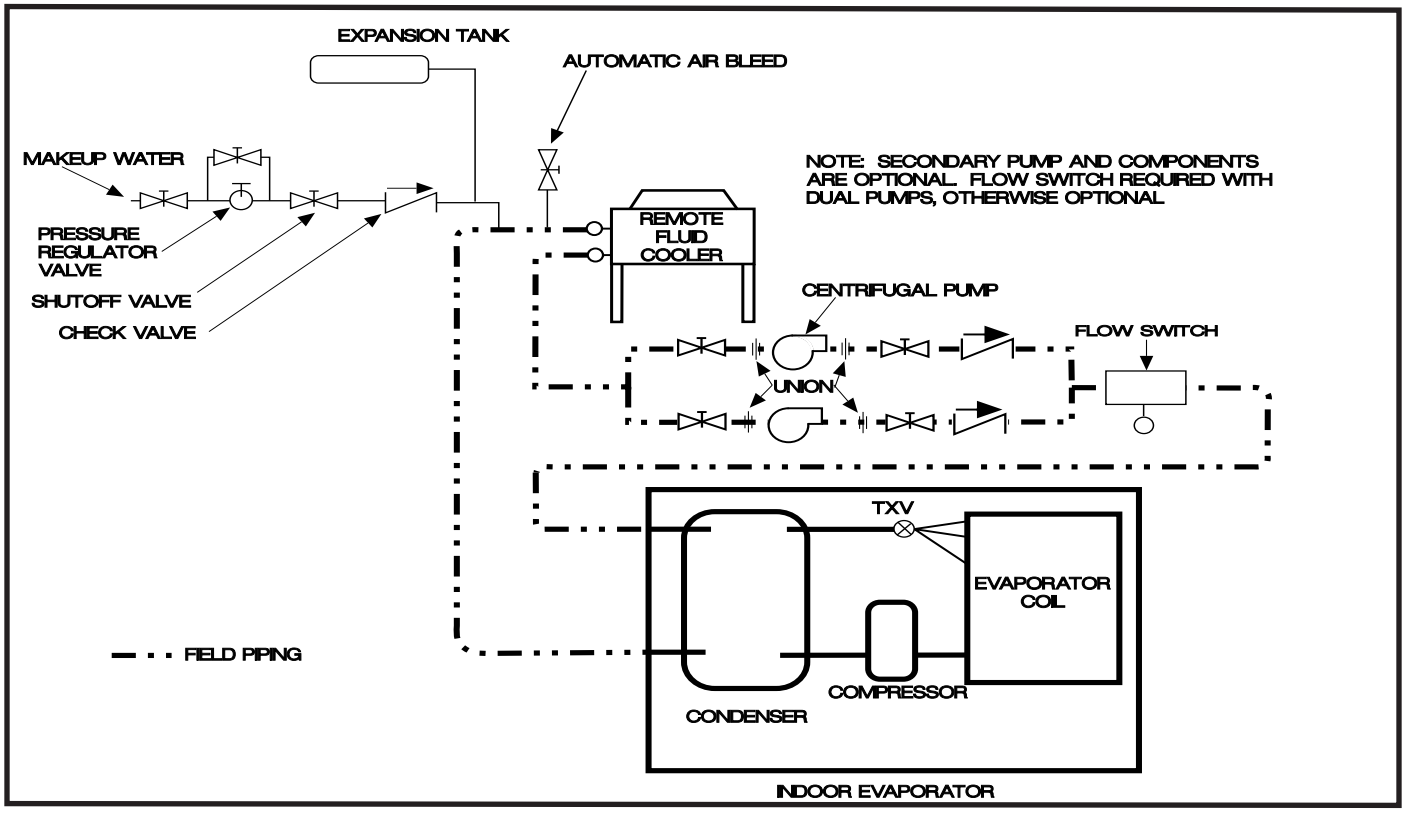
Water cooled units may also be connected to building water or tower water sources. Pipe size will depend on length of run and the maximum water flow required.

All chilled water pipes have a cap installed on the end of the pipe for pressure testing the system, these caps need to be removed before installing the water piping to the CRAC unit. This can be accomplished with a tubing cutter for smaller pipes and reciprocating saw with a metal cutting blade for larger pipes or if there is a clearance problem.

Shutoff valves, field provided, should be installed within a few feet of the inlet and outlet connections of the CRAC unit to allow the unit to be isolated for service. There should be a means of draining the unit for service. Drain valves with hose bib connections should be located at the lowest point on the piping connected to the units for this purpose. A fill valve with a hose bib connection should also be used on the supply line or return line at the unit to allow the unit to be drained.

All water/glycol cooled units with plate-fin type condensers have a strainer shipped loose. This strainer should be field installed in the supply line with shut off valves, field provided, before and after the strainer, the strainer must be cleaned periodically.

One of the most common problems in a water/glycol system is the presence of air in the condenser water loop. Air vents must be installed in various locations in the piping system to purge the air.



2.2.1 Connection Sizes, Water/Glycol Cooled Units

Evaporator Model	Water IN and OUT Connections, OD
DAMA 0112	3/4”
DAMA 1.512	3/4”
DAMA 0212	3/4”
DAMA 2.512	3/4”

2.2.2 Connection Sizes, Fluid Coolers

Fluid Cooler Model	Water IN and OUT Connections, OD
DAFC 06	1-5/8”
DAFC 07	1-5/8”
DAFC 09	1-5/8”
DAFC 11	2-1/8”
DAFC 15	2-1/8”
DAFC 17	2-5/8”

2.3 Auxiliary Chilled Water/Energy Saver Coil Piping

Units with an Auxiliary Chilled Water cooling coil require a separate source of chilled water. The chilled water connection sizes will be equal to the condenser water connection sizes on the chart in Section 2.2.2. Units with an Energy Saver cooling coil have shared piping with the condenser supply and therefore do not require a separate water source.

2.4 Condensate Drain Piping

The evaporator section has a 3/4” FPT connection on the bottom for condensate removal. Vertical units have the 5” plenum below the evaporator drain pan with knockouts that allow field supplied and installed condensate lines to be routed out either side of the unit. A union is recommended at the field connection which will permit easy disconnection from the unit for cleaning.

A trap should be built into the drain line to prevent air from backing up into the unit. Drain lines should be pitched downward not less than 1/4” for each ten feet of horizontal run. Do not reduce the size of the drain line. Where local codes permit, PVC pipe may be used.

Some applications have no convenient means of allowing a gravity drain. In this case, a condensate pump can be used. These come either factory mounted or shipped loose. Factory mounted condensate pumps do not require a separate power source.

Condensate pumps shipped loose (or field provided) typically require a dedicated 110 volt power source. Field pipe connections must be made to the pump discharge connection. A check valve must be installed to prevent backflow. Also see condensate pump electrical requirements in Section 3.9.

2.5 Humidifier Piping

The optional humidifier offered on Mini Ceiling systems is a steam generator type with a disposable cylinder. The humidifier makeup water should be brought to the humidifier through the field connection opening using 1/4" copper tubing. A compression fitting is provided at the humidifier. A shutoff valve should be provided outside the unit to allow disconnection of service. An in-line water pressure regulator and strainer should be installed. Water pressure should be set between 30 and 80 PSI.

The humidifier has a drain at the bottom which is factory piped to the main condensate drain line. The dispersion tube also has a drain line. No additional field piping is required.

2.6 Leak Testing

No installation is complete until the entire system has been thoroughly checked for leaks. This includes checking refrigerant tubing, flare fittings, pressure controls, shrader fittings and compressor rotalock service valves.

In addition to the refrigeration system, check all condenser water lines, humidifier makeup lines, condensate lines, condensate pumps, chilled water lines, centrifugal pumps and fluid coolers as applicable.

When handling and recovering refrigerant, it is not permissible to release refrigerant into the atmosphere. Many leak-test methods recommended in the past are no longer possible. Current standard practices must be used.

Pressurize system circuit to 150 PSIG (1034kPa) by using dry nitrogen with a trace of refrigerant. Check the entire system for leaks with suitable leak finder, (per local code) including but not limited to all braze joints, caps and fittings, and flare nuts on both field and factory furnished components. After completion of leak testing, release test pressure and pull a vacuum on the system.

Tightening of fittings and valves is the responsibility of the installing contractor.

2.7 Evacuation

Evacuate the refrigerant lines, condenser coil, and evaporator coil to 250 microns or lower (a micron gauge and 2-stage vacuum pump are required). Valve off and turn off the vacuum pump and wait for at least 15 minutes to make sure the micron gauge reading does not go back up above 700 microns. If it does, re-start the vacuum pump and evacuate until the system reaches 250 microns. If the system still does not hold the pressure below 700 microns the system needs to be rechecked for leaks.

After the system has been satisfactorily evacuated the unit(s) can be charged with refrigerant. Connect the pressure gauge manifold set to the high and low ports near the compressor, connect the charging line to the refrigerant tank and set it for liquid feed. Open the refrigerant tank valve and purge the line at the manifold, then open the high side valve on the manifold only, and allow the refrigerant flow until the system pressure equalize, at this point the system will have 75 to 80% of the total refrigerant charge. Start the blower and then the compressor checking the operating pressure and temperatures.

Do not apply power to the compressor when in a vacuum.

3.0 ELECTRICAL CONNECTIONS

Before proceeding with the electrical connections, make certain that the volts, hertz and phase correspond to that specified on the unit electrical nameplate. Use copper conductors only.

3.1 Electrical Service

Check to be sure the service provided by the utility is sufficient to handle the additional load imposed by this equipment. Indoor package units have a single power source. Indoor split units typically have a single power source but can also be provided with separate sources. Field-provided, interconnecting control wires are also required. Units with outdoor secondary heat exchangers will require a separate power source and field-provided, interconnecting control wires as well. See section 3.5 below.

Remote outdoor condensers and condensing units require one power source. Glycol systems with fluid coolers and loose pump(s) typically require one power source for the fluid cooler and will require one additional source for a single pump or two additional sources for dual pumps. Systems where the pump(s) are mounted and piped integral to the fluid cooler will usually require a single power source.

3.2 Nameplate Ratings

Refer to the unit electrical nameplate for equipment electrical requirements. Minimum Circuit Ampacity, also known as Wire Sizing Amps, will dictate the minimum required wire gage. Maximum Overcurrent Protection Device amps will dictate the maximum circuit breaker or fuse size.

3.3 Grounding

The unit cabinet must have an uninterrupted true earth ground. An electrical ground wire of adequate size must be connected to the ground lug provided inside the main electrical box.

3.4 Voltage Tolerance

The supply voltage to the unit must be within tolerance of -5%, +10% for 208-230 volt, +/- 10% for 277 volts. The local utility company should be contacted for correction of improper line voltage. Deviation from voltage ratings can cause premature failures and possibly void unit warranty.

Check the wiring connections in the unit control panel to ensure they are tight. Screw terminals may become loose in transit. tightening of wiring connections is the responsibility of the installing contractor.

3.5 Auxiliary Control Wiring

For secondary heat exchangers (condensers and fluid coolers) connect two 18 gage wires from the electrical box of the indoor evaporator to the electrical box of the remote heat exchanger. Refer to the wiring diagrams located int he electrical control panel of each unit. On most remote heat exchangers the terminals will also be #39 and #40. All control wiring on Data Aire equipment is 24 VAC.

Condensing units (compressors mounted in condenser) typically require more wires. Refer to wiring diagrams in the units.

Check the wiring connections in the unit control panel to ensure they are tight. Screw terminals may become loose in transit. Tightening of all wiring connections is the responsibility of the installing contractor.

3.6 Remote Shutdown

Every Data Aire evaporator has remote shutdown contact points available. These are intended for a field supplied dry contact or switch to be wired across two terminals. When the contact or switch opens, the control circuit power is interrupted and the unit shuts down, including the control panel. The control circuit is 24 VAC and the field provided contact or switch and wiring should have a minimum rating of 10 amps, a minimum of 18 gauge wire is recommended.

The remote shutdown contacts are always terminals #1 and #2 on the terminal block designated TB1. The unit is shipped with a factory jumper wire that connects terminal #1 to terminal #2. Remove this wire prior to installing the field wires.

3.7 Remote Alarm Contacts

3.7.1 If the optional Mini DAP® II microprocessor control panel is ordered with the optional summary alarm module, a remote alarm output contact can be field accessed on terminals #14 and #15 of terminal block TB1. This is a normally Open, Close on Alarm, dry contact, intended to be used in a control circuit not exceeding 5 amps at 24 VAC. This output contact will close on a failure and remain closed until the alarm is no longer present.

3.7.2 If the optional Mini DAP III microprocessor control panel is ordered with the optional summary alarm module , a remote alarm output contact can be field accessed on terminals #11 (common) and #12 (normally closed) or #13 (normally open) of terminal block TB1. This is a normally open or normally closed, dry contact, will reverse position upon alarm and is intended to be used in a control circuit not exceeding 5 aps at 24 VAC. This output contact will reverse position on a failure and remain reversed until the alarm is no longer present.

3.8 Remote Sensors

3.8.1 The optional Mini DAP II panel normally comes with sensors mounted in the panel. Although these existing sensors can be removed for remote mounting, the remote sensor option provides a more convenient means of field installation. This is because the sensors are already connected to a predetermined length of cable and come mounted in a remote sensor enclosure. The temperature and humidity sensors require a total of six wires. This should be a twisted, shielded cable.

3.8.2 The optional Mini DAP III panel normally comes with sensors mounted in the panel. Although these existing sensors can be removed for remote mounting, the remote sensor option provides a more convenient means of field installation. This is because the sensors are already connected to a predetermined length of cable and come mounted in a remote sensor enclosure. The temperature and humidity sensors require a total of five wires. This should be a twisted, shielded cable.

3.9 Condensate Pumps

Condensate pumps which ship loose normally require a separate source of 110 volt power. Always check the pump power requirements before connecting power. Condensate pumps are available in other voltages.

Condensate pumps may also come unit mounted and wired in the unit as a factory option. While no outside power source is required, field piping is still a requirement.

4.0 INSTALLATION OF REMOTE OUTDOOR HEAT EXCHANGER

Air cooled condensers and fluid coolers have individual Installation, Operation and Maintenance manuals which should be referred to for more complete details.

4.1 Rigging

This section covers outdoor condensers/condensing units and fluid coolers. For indoor condensers and condensing units refer to section 1.3.4. Outdoor heat exchangers should be moved to their (typically rooftop) mounting location using a crane or fork lift. Each fan section have supports with lifting holes at the top.

Do not lift with a choke sling around the unit. Spreader bars are recommended for lifting multiple fan units. Under no circumstances should the coil headers or piping be used for lifting the unit. Ideally, the unit should be kept in its shipping crate until it is ready to be set in place.

4.2 Leg Assembly

Most condensers and condensing units matched up with Mini Ceiling units are self-contained and require no field modification to the mounting legs. Larger condensers/condensing units and fluid coolers, size “06” and larger, have legs that must be unbolted from their collapsed shipping position and extended prior to placing the unit on its pad.

Each leg extends down approximately 18” and reattaches using the same bolts, the bolts are placed through the lower set of holes on the bracket.

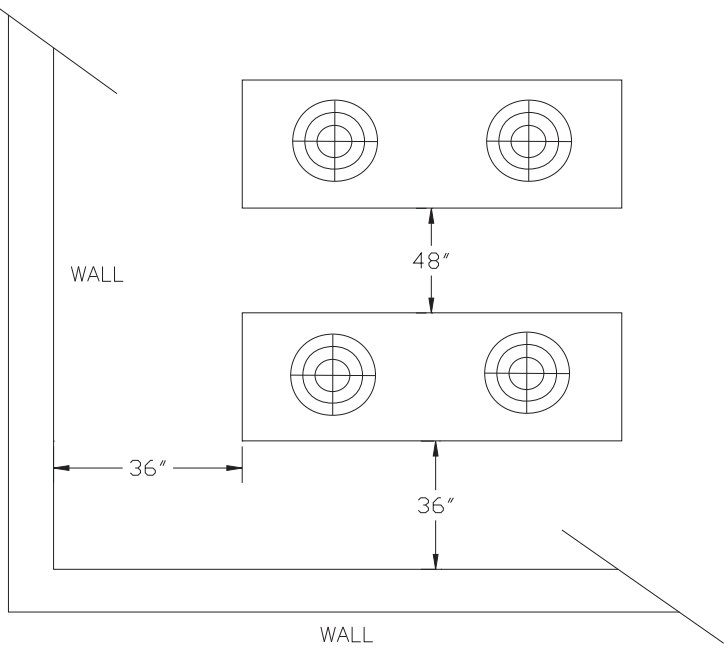
Note: Failure to extend the legs will result in poor air distribution over the cooling coil resulting in significant capacity reduction and potential high discharge pressure problems.

Concrete pads or a rail system are often used to provide support for the heat exchanger. Bolt holes in the bottom of each leg can be used to anchor the unit.

4.3 Locating the Remote Heat Exchanger

The remote heat exchanger must be located in an area that will ensure free air flow into and out of the heat exchanger plus adequate service access clearance. Short circuiting of the air flow or the intake of warmer air from another unit will seriously degrade the performance of the air cooled heat exchanger.

Do not locate the heat exchanger in a location that is bordered by tall obstructions (i.e., higher than 10 feet) on no more than two sides. See Figure at right for minimum clearance from obstructions and between units. With proper clearance on all sides, two units can be placed side by side. Additional units should be placed at least 48 inches apart.



Noise factors should be also considered when locating an air cooled heat exchanger. Proximity to windows, walls, and surrounding structures can cause objections by the occupants. An acoustical expert should be consulted when noise is of a particular concern.

Air cooled heat exchangers should be placed at a level that is higher than the indoor evaporator. Mounting the remote heat exchanger (condenser or condensing unit) more than 10 feet below the evaporator is not recommended. Excessive liquid line pressure drop can cause poor evaporator performance.

Piping must be supported within 18 inches of the inlet and outlet connections. The inlet connection is located on the top header on all remote heat exchangers and the outlet connection is located on the bottom header of all units.

4.4 Electrical Service

Refer to Sections 3.1 to 3.5 for information regarding line voltage and control voltage wiring details.

4.5 Air Cooled Condensers - Model DARC

Standard outdoor air cooled condensers have a fan speed controller on the first fan. On single-fan condensers this is the only means of control. A variable speed controller modulates the motor speed based on system head pressure. The fan speed controller will normally not require field adjustment.

Air cooled condensers should be placed at a level that is above the level of the indoor evaporator. Mounting a condenser or condensing unit more than ten feet below the evaporator is not recommended. Excessive liquid line pressure drop can cause poor evaporator performance.

4.6 Fluid Coolers - Model DAFC

4.6.1 Fluid-Sensing Thermostats

Fluid cooler fan motors are cycled on and off by individual water-sensing thermostats strapped to the leaving water header. The fan motor will only have a thermostat if the unit has an energy saver coil. Without the optional energy saver coil, the first fan motor runs whenever there is a call for cooling via an auxiliary signal sent by the indoor evaporator (see also Section 3.5).

The water-sensing thermostats have adjustable setpoints which are typically staggered to maintain water temperature in the 85 to 105^{o} F range. This is generally the desired range for glycol cooled systems.

4.6.2 Energy Saver Cooling

In colder climates, the evaporator will often be equipped with an additional free cooling coil to take advantage of the colder ambient temperatures. When incoming fluid falls below the setpoint of a water-sensing thermostat in the evaporator (typically about 50^{o} F), energy saver cooling becomes available.

Systems with an energy saver coil should have at least one fluid-sensing thermostat on the fluid cooler set lower to take advantage of colder ambient temperatures. The desired fluid temperature for energy saver cooling is 45^{o} F. Field adjustment of fluid-sensing thermostats is not unusual.
It is desirable to use the energy saver mode as much as possible. However, fluid temperature that

is too cold can cause excessive dehumidification and coil sweating. Fluid temperature that is too high can cause the indoor space temperature to rise. This can cause the optional microprocessor controls to lock out the energy saver mode for one hour while it reverts back to compressorized cooling. Adjust the setpoints of the thermostats to allow the maximum free cooling time. Overcooling or undercooling the fluid should be avoided.

Every application will have a different ambient temperature and indoor heat load/ air distribution profile. Therefore it is not possible to dictate the exact water-sensing thermostat setpoints. Field adjustments are typical to allow fine-tuning to specific conditions

5.0 CHARGING

5.1 Air Cooled Systems

5.1.1. Package Air Cooled Systems

Package air cooled units come factory charged because, even though the condenser blower section ships loose, all of the refrigerant carrying components are self-contained within the evaporator section.

A properly charged system operating at typical parameters will have a head pressure of 225 to 275 psi. Suction temperature should be 58 psi or greater. The superheat at the compressor suction line at least 6 inches away from the compressor should be 8-15^{o} F.

An air cooled package unit may require field charging if a compressor is changed, if a leak develops or if non-condensables are in the system. Field charging should be done by referring to the unit electrical nameplate for the factory charge.

Although this figure represents the original factory charge, it is still necessary to measure and note proper unit operation including superheat, head and suction pressure. Some adjustment to charge may be required.

Before starting a compressor, the crankcase heater should be energized for a minimum of 12 hours to reduce the possibility of liquid slugging on start-up. Failure to energize the crankcase heater could result in compressor damage.

5.1.2 Split Indoor Air Cooled Systems Charging

After the field refrigerant piping is properly completed, connect the refrigerant drum to the low side and charge with vapor. Charge with approximately three lbs. per nominal ton. For example, a model DAPA 0334-CO is a nominal three ton unit. Charge with about nine lbs. of refrigerant to begin. It is likely that more refrigerant will be required to complete the charging procedure. Make sure all hoses are properly purged. Before starting a compressor, the crankcase heater should be energized for a minimum of 12 hours to reduce the possibility of liquid slugging on start-up. Failure to energize the crankcase heater could result in compressor damage Start the evaporator fan and compressor. Check the liquid line sight glass to get a feel for the approximate charge. Bubbles in the sight glass are not unusual at this point and can be caused by flashing from liquid line pressure drop, low subcooling or low charge. It is likely that more refrigerant will be required to complete the charging procedure.

Adjust the refrigerant charge until the sight glass has only sparse bubbles. The unit should be allowed to stabilize for several minutes before meaningful measurements can be taken. A properly charged system operating at typical parameters will have a head pressure of 225 to 275 psi. Suction temperature should be 58 psi or greater. The super heat at the compressor suction line at least six inches away from the compressor should be 8-15^{o} F.

Note: Charging to a full liquid line sight glass should never be the sole means of determining the correct refrigerant charge. Other parameters such as superheat, suction pressure, head pressure, subcooling and ambient temperature are also important parameters. A system charged to a clear sight glass is often over-charged.

5.1.3. Fan Speed Control System Charging

The standard outdoor air cooled condenser for Data Aire equipment is a fan speed control system. Connect the refrigerant drum to the low side of the system. Make sure all hoses are properly purged. From a vacuum, feed liquid refrigerant into the high side of the system until the pressure equalized, at this pint there will be about 79 to 80% of the total charge of the system. Charge with approximately three pounds per nominal ton plus the line set. Charge circuit with about six pounds of refrigerant to begin.

For example, a model DAMA 0212 is a nominal 2 ton unit. Charge with about six lbs. of refrigerant to begin. It is likely that more refrigerant will be required to complete the charging procedure. Make sure all hoses are properly purged.

Before starting a compressor, if the system has a refrigerant holding charge, the crankcase heater should be energized for a minimum of 12 hours to reduce the possibility of liquid slugging on start-up. Failure to energize the crankcase heater could result in compressor damage.

If the system is charged from a vacuum, the pre-heating of the compressor is not necessary, start the system and allow the system to stabilize to room temperature. Bubbles in the sight glass are not unusual at this point and can be caused by flashing from liquid line pressure drop, low sub-cool, or low charge. It is likely that more refrigerant will be required to complete the charging procedure.

Adjust the refrigerant charge until the subcooling is between 8 and 10^{o} F and the super heat is 8 to 15^{o}F, there will be flashing and/or bubbles in the sight glass when the system is properly charged.

After the system is allowed to stabilize, verification of a few key measurements should be noted. The discharge pressure should be about 225 to 275 psi and the subcooling should be 8-10^{o} F, depending on ambient conditions. Suction temperature should be 58 psi or greater. The superheat at the compressor suction line at least six inches away from the compressor should be 8-15^{o} F, for units that are water/glycol cooled and air cooled units with air cooled condensers. Units with remote condensing units the superheat should be 20 to 25^{o} F at the compressor, the subcooling will be the same 8 to 10^{o} F.

Note: Charging to a full liquid line sight glass should never be the sole means of determining the correct refrigerant charge. Other parameters such as superheat, suction pressure, head pressure, subcooling and ambient temperature are also important parameters. A system charged to a clear sight glass is often over-charged.

5.1.4. Flooded System Charging

Flooded systems are units having refrigerant circuits with an optional liquid receiver and head pressure control valve. When the ambient temperature falls during cold weather, the head pressure control valve will regulate the flow of refrigerant to ensure nearly constant receiver pressure. The condenser is partially flooded with liquid in cold weather. In warm weather the extra refrigerant is stored in the receiver.

Flooded systems require more refrigerant than fan speed control systems. Connect the pressure gauge manifold set to the high and low ports near the compressor, connect the charging line to the refrigerant tank and set it for liquid feed. Open the refrigerant tank valve and purge the line at the manifold, then open the high side valve on the manifold only and allow the refrigerant flow until the system pressure equalize, at this point the system will have 75 to 80% of the total refrigerant charge. Start the blower and then the compressor checking the operating pressures and temperatures.

If the unit has a holding charge, before starting a compressor, the crankcase heaters should be energized for a minimum of 12 hours to reduce the possibility of liquid slugging on start-up. Failure to energize crankcase heaters could result in compressor damage.

Start the evaporator fan, verify correct fan rotation, then start the compressor. Check the liquid line sight glass to get a feel for the approximate charge. Bubbles in the sight glass are not unusual at this point and can be caused by flashing from liquid line pressure drop, low subcooling or low charge. It is likely that more refrigerant will be required to complete the charging procedure.

Adjust the refrigerant charge until the sight glass clears or has only sparse bubbles. The unit should be allowed to stabilize for several minutes before meaningful measurements can be taken.

If the receiver (head) pressure is below 230 psi, block part of the condenser coil surface until the pressure rises to 230 psi or higher. During extremely cold weather, all of the condenser fans may have to be de-energized to maintain 230 psi.

Observe the sight glass on the receiver. Add refrigerant vapor through the suction line until the level of liquid in the receiver is approximately is the bottom (the leveling ball at $^1/_3$ level) of the sight glass which is at the 80% of circuit charge. Observing the receiver sight glass becomes difficult when they are remote mounted near the condenser.

After the system is allowed to stabilize, the superheat at the compressor suction line at least six inches away from the compressor should be 8-15^o F. Units with remote condensing (DRCU) units the superheat should be 20 to 25^o F at the compressor, the subcooling will be the same 8 to 10^O F as the standard unit. Remove the block from the condenser coil. If the ambient temperature while charging is below about 60^o F some of the refrigerant will be backed up in the condenser coil, causing the liquid level in the receiver to drop.

Note: Charging to a full liquid line sight glass should never be the sole means of determining the correct refrigerant charge. Other parameters such as superheat, suction pressure, head pressure, subcooling and ambient temperature are also important parameters. A system charged to a clear sight glass is often over-charged.

5.2 Water/Glycol Cooled Systems

5.2.1. Water/Glycol Cooled Systems Charging

All water/glycol cooled units are factory charged. The water regulating valve should be adjusted to maintain 230 to 260 psi head pressure. Suction temperature should be 58 psi or greater. The superheat at the compressor suction line at least six inches away from the compressor should be 8-15 degrees.

Field charging water/glycol systems should be done by referring to the unit electrical nameplate for the factory charge. Although this figure represents the original factory charge, it is still necessary to measure and note proper unit operation including superheat, head and suction pressure. Some adjustment to charge may be required.

Adjust the refrigerant charge until the sight glass has sparse bubbles. The unit should be allowed to stabilize for several minutes before meaningful measurements can be taken and the conditioned room should be at or near the temperature setpoint.

All water/glycol cooled units have a water regulating valve. A head pressure sensing transducer is connected to a shrader fitting on the discharge line and water is regulated into the condenser coil. Condenser coils may be plate fin or coaxial type.

Before starting a compressor, if there has been a refrigerant holding charge, the crankcase heaters should be energized for a minimum of 12 hours to reduce the possibility of liquid slugging on start-up. Failure to energize crankcase heaters could result in compressor damage.

Note: Charging to a full liquid line sight glass should never be the sole means of determining the correct refrigerant charge. Other parameters such as superheat, suction pressure, head pressure, subcooling and ambient temperature are also important parameters. A system charged to a clear sight glass is often over-charged.

5.2.2. Factory Charge for Water/Glycol Cooled Systems

Evaporator Model	Factory Charge per Ckt, Lbs. R-22
DAMW 0112	2.00
DAMW 1.512	2.00
DAMW 0212	2.25
DAMW 2.512	2.25

5.3 Refrigerant Handling

The use of recovery/recycling units is required by U.S. Environmental Protection Agency (EPA) regulations. Technicians who service and dispose of air conditioning and refrigeration equipment must recover the refrigerant instead of venting to atmosphere.

Except for extremely small releases of refrigerant such as what occurs when disconnecting service hoses (diminimous release), a technician who knowingly releases or vents refrigerant to the atmosphere is in violation of this regulation. Refrigerant purchasers must be certified technicians and have a valid EPA certification card.

5.4 Important Refrigeration Components

5.4.1. Expansion Valve

Each refrigerant circuit has an adjustable thermo-expansion valve (TXV). These are factory adjusted to their nominal rating. Any field adjustment should be to fine tune a system that has stabilized and already has acceptable operating parameters.

5.4.2. High Pressure Cutout Switch

Each refrigerant circuit is protected by a high head pressure cutout switch with a manual reset button. The cutout pressure rating for refrigerant R-22 or R-407C is 400 psi. Physical location is near the compressor which may be either in the evaporator or the condensing section.

5.4.3. Low Pressure Cutout Switch

Each circuit also contains a low suction pressure cutout switch with automatic reset. The cutout pressure rating for this switch is 30 psi. Physical location is near the compressor which can be either in the evaporator or the condensing section.

6.0 GLYCOL SYSTEMS

6.1 Glycol Concentration

The system must be filled with water and the appropriate amount of ethylene or propylene glycol to protect against winter freeze-up. To achieve the approximate glycol concentration, it is necessary to know the total system volume. This consists of the sum of the fluid cooler volume, the evaporator unit volume, and the volume of the interconnecting piping.

The following tables can be used for arriving at an approximate system volume. After installation, the glycol percentage should be checked. The glycol percentage should also be checked at regular intervals to ensure freeze protection.

6.2 Internal (Fluid) Volume

Evaporator Internal Volume Model	Without Energy Saver Coil Volume, Gallons	With Energy Saver Coil Volume, Gallons
DAMG 0112	0.5	2.0
DAMG 1.512	0.5	2.0
DAMG 0212	0.8	2.5
DAMG 2.512	0.8	2.5

6.3 Fluid Cooler Internal Volume

Fluid Cooler Model	Internal Volume, Gallons	Fluid Cooler Model	Internal Volume, Gallons
DAFC 06	2.5	DAFC 17	6.6
DAFC 07	3.4	DAFC 21	7.4
DAFC 09	4.2	DAFC 24	9.8
DAFC 11	3.3	DAFC 28	12.3
DAFC 15	4.9		

6.4 Copper Piping Internal Volume

Pipe Diameter, inches	Volume per 100 Feet of Pipe, Gallons
5/8	1.2
3/4	1.8
7/8	2.5
1-1/8	2.5
1-5/8	4.3
2-1/8	9.2

6.5 Freezing Point of Aqueous Solutions

Ethylene Glycol, % by Volume	Freezing Point Degrees F.	Propylene Glycol, % by Volume	Freezing Point Degrees F.
0	32	0	32
10	24	10	27
20	15	20	18
30	4	30	8
40	-13	40	-6
50	-33	50	-26

7.0 CONTROLS

7.1 Standard Thermostat

The standard controls on all Mini Ceiling system equipment is a single stage cooling thermostat. Units requiring optional reheat and/or humidifier require the optional Mini DAP II control panel described below.

7.2 Optional Programmable Thermostat

This optional thermostat is the same as the standard thermostat except it has some simple programmable functions. This control cannot be used with optional reheat or humidifier options.

7.3 Optional Mini DAP® II Microprocessor Control Panel

The Mini DAP II microprocessor control panel is available as an option. This control panel is required when a unit has reheat and/or humidifier options. There is a separate manual that goes into extensive detail regarding functions, features, programming and troubleshooting.

The Mini DAP II microprocessor control panel has an entire manual dedicated to its use and operation. This manual must be referenced to complete a thorough unit installation. Start-up is not complete until the Mini DAP II control panel settings are established.

7.4 Optional Mini DAP® III Microprocessor Control Panel

The Mini DAP III microprocessor control panel is available as an upgrade from the Mini DAP II panel and offers additional features including remote communications (with additional communication card options). There is a separate manual that goes into extensive detail regarding functions, features, programming and troubleshooting.

The Mini DAP III microprocessor control panel has an entire manual dedicated to its use and operation. This manual must be referenced to complete a thorough unit installation. Start-up is not complete until the Mini DAP III control panel settings are established.

7.5 Secondary Heat Exchangers

Most of the controls on remote condensers, condensing unit and fluid coolers consist of basic electromechanical type components. Secondary heat exchangers have separate installation and operation manuals which give complete details on adjusting thermostat settings, etc. Refer also to details in Section 3.5 within this manual.

7.6 Wiring Diagrams

Every Data Aire evaporator, condenser, condensing unit or fluid cooler comes with a wiring diagram. These diagrams are 'ladder'-type schematics intended for service personnel. The intent is to allow the technician to understand the wiring details associated with the electrical components and how they interface with the controls as well as peripheral equipment, including secondary heat exchangers.

The wiring diagram in the evaporator will indicate field interface terminals to the secondary heat exchanger. The internal wiring of the heat exchanger is found on a separate diagram which can be found on the inside cover of the heat exchanger electrical box. Both diagram types are also placed inside the shipping/warranty packet that is placed inside the evaporator.

Evaporator wiring diagrams will have a drawing number which starts out with the three letter designation, "DAM". An example of a typical diagram is DAM-S-378 S. Wiring diagrams for condensers or condensing units start out with the three letter designation, "DRC". An example of a typical diagram is DRC-S-001. Wiring diagrams for fluid coolers start out with the three letter designation, "DFC". An example of a typical diagram is DFC-S-001.

8.0 REGULAR MAINTENANCE ITEMS

8.1 Air Filters

Filters should be checked on a regular basis and changed when they become dirty. This will ensure efficient operation of the unit. Spare filters should be kept in stock as these tend to be a frequently replaced maintenance item. Filters may require changing as often as monthly. Note also that construction dust on new installations will quickly clog new filters.

The optional Mini DAP II or Mini DAP III control panel can monitor filters with an optional dirty filter alarm. Although the unit may have a dirty filter alarm, this should not be relied on as the only determinant for replacing filters. A mis-adjusted filter differential pressure switch may not give a proper indication of a clogged filter.

To check the filter differential pressure switch for proper adjustment, temporarily cover about 75% of the return air opening using heavy cardboard or similar material. The alarm should energize when 75% of the air is blocked, simulating dirty filters. If the alarm energizes prematurely or does not energize at all, the pressure switch should be adjusted. Panels must remain closed when determining if an adjustment is necessary.

Filters that require changing can restrict airflow and create problems such as coil icing or poor air distribution.

8.2 Belts

Belt tension should be checked regularly (monthly) to ensure proper tension. If tightening is required, loosen the four motor mounting bolts. Turn the adjustment screw on the end of the motor mounting channel until the proper belt tension is attained. Retighten the four mounting bolts. Damage can occur to belts that are overtightened. The amount of play in a typical driveset should be 1/2 inch. When tightening the belts make sure the pulley alignment is true. If the belts are over tightened or if the pulleys are mis-aligned the bearing life and belt life is shortened considerably.

8.3 Bearings

Bearings used on Mini Ceiling units are permanently lubricated and do not require maintenance.

8.4 Humidifier Canisters

The optional steam generator type humidifier does not require maintenance other than to replace the canister as required. This frequency will depend on usage and water type. A set of manufacturer's instructions for the humidifier is sent as part of the paperwork placed inside the unit when it ships.

8.5 Fuses

Always replace fuses with those of the equivalent rating with regard to: 1) amperage, 2) voltage, and 3) speed. For instance compressors and motors are inductive loads which require time delay fuses. Electric reheat and humidifiers are resistive loads requiring fast acting fuses.

8.6 Heating Elements

Heating elements do not normally require maintenance. However sometimes they may accumulate a film of dust or dirt when unused for extended periods of time. When energized, the burning debris can create smoke or unpleasant odor. To help avoid this, periodic cleaning is recommended.

8.7 Refrigerant Filter Drier

Factory installed refrigerant filter driers do not normally require maintenance. When replacing compressors or other repairs that open the refrigeration system to atmosphere, it is advisable to replace the filter drier. The equivalent type and size should be used.

9.0 Warranty Policy

Seller warrants its equipment to Buyer to be free from defects in material and workmanship for a period of eighteen (18) months from date of shipment, as long as equipment is utilized under normal conditions and service and is properly installed; however, the warranty shall not be applicable to any of the following items: refrigerant, belts, filters, humidifier, heaters not regularly cleaned, light bulbs, and any other items either consumed or worn out by normal wear and tear, or by conditions beyond Seller's control, including (without limitation as to generally) polluted or contaminated air or water.

The Seller's obligation under this warranty is limited solely to the repair or replacement, at Seller's options, of any part or parts thereof which shall, within eighteen (18) months from date of shipment of the equipment to the original purchaser be returned to the factory, transportation charges prepaid, which upon examination shall disclose to the Seller's satisfaction to have been defective under normal use and service. This agreement to repair or replace defective parts is expressly in lieu of all other warranties, expressed or implied and all other obligations or liabilities on the part of Seller and Seller neither assumes nor authorizes any other person to assume for it any liability or obligation in connection with the sales or service of its equipment, except said repair or replacement of defective parts set forth above.

This warranty does not include any labor charges for work done outside of the factory for replacement of parts, adjustments, repairs, or any other work. Seller's liability does not include any resulting damage to persons, property, equipment, goods or merchandise arising out of any defect in or failure of any equipment of its manufacture and Buyer hereby waives any claim against Seller arising out of such claim. This warranty shall not cover the repair or replacement of any equipment which has been repaired or altered outside of the factory in any way or which has been subject to negligence, misuse, or abuse, or to pressures in excess of stated limits.

This warranty applies only to the original purchaser of the equipment and does not extend, expressly or by implication, to the third parties or others without the specific written approval and acknowledgment of Seller. Buyer's exclusive remedy and Seller's maximum liability for any and all loss, injury, damage, costs, or expense arising from any defect covered by this warranty shall be limited to the repair or replacement, but not the installation of any defective material, F.O.B., Seller's plant; provided however, that Seller shall not be required to replace any part or component (a) which can be repaired, or (b) unless Buyer has given Seller immediate written notice that replacement or repair. In Addition, Seller shall not be liable for any cost or expense of replacement or repair contracted for by Buyer with any third person, unless, and then only to the extent that Seller authorizes in writing, such costs or expense.

Seller shall not be liable for any direct, indirect incidental, consequential, or other form of loss, injury, damage, cost, or expense, whether caused by delay, failure, or performance, breach of warranty, or by any cause whatsoever.

Seller's obligation under this warranty shall be void if Buyer fails: (a) without legal justification to pay Seller, when due, the full purchase price for the equipment sold hereunder; or (b) to have the equipment sold hereunder installed, maintained, and serviced by competent personnel and in accordance with Seller's instructions.

10.0 Contact Data Aire

Address:

DATA AIRE INC.
230 W. BLUERIDGE AVE.
ORANGE, CA 92865

Phone:

714-921-6000	
800-347-AIRE (2473)	Toll Free

Fax:

714-921-6003	
714-921-6010	Main
714-921-6011	Engineering
714-921-6022	Part Sales

E-mail:

tech_support@dataaire.com	Technical Support
engineering@dataaire.com	Engineering
sales@dataaire.com	Sales

Web site:

www.dataaire.com

Job Information:

Data Aire Job Number: _____

Evaporator Serial Number: _____

Evaporator Model Number: _____

Condenser/Fluid Cooler Serial Number: _____

Condenser/Fluid Cooler Model Number: _____

RECOMMENDED LINE SIZING FOR AIR COOLED SPLIT SYSTEMS
UP TO 200 EQUIVALENT FEET

HOT GAS LINES

SINGLE CIRCUIT SYSTEMS

Unit Tonnage	Tons per Circuit	EQUIVALENT FEET 50	100	150	200
1	1	5/8	5/8	5/8	7/8
1.5	1.5	5/8	5/8	7/8	7/8
2	2	5/8	7/8	7/8	7/8
2.5	2.5	5/8	7/8	7/8	7/8
3	3	7/8	7/8	7/8	7/8
4	4	7/8	7/8	7/8	1-1/8
5	5	7/8	1-1/8	1-1/8	1-1/8
6	6	7/8	1-1/8	1-1/8	1-1/8
8	8	1-1/8	1-1/8	1-3/8	1-3/8
10	10	1-1/8	1-1/8	1-3/8	1-3/8
13	13	1-1/8	1-3/8	1-3/8	1-3/8

DUAL CIRCUIT SYSTEMS

Unit Tonnage	Tons per Circuit	EQUIVALENT FEET 50	100	150	200
6	3	7/8	7/8	7/8	7/8
8	4	7/8	7/8	7/8	1-1/8
10	5	7/8	1-1/8	1-1/8	1-1/8
13	6.5	7/8	1-1/8	1-1/8	1-1/8
16	8	1-1/8	1-1/8	1-3/8	1-3/8
20	10	1-1/8	1-1/8	1-3/8	1-3/8
26	13	1-1/8	1-3/8	1-3/8	1-3/8
30	15	1-3/8	1-3/8	1-3/8	1-5/8

LIQUID LINES

SINGLE CIRCUIT SYSTEMS

Unit Tonnage	Tons per Circuit	EQUIVALENT FEET 50	100	150	200
1	1	3/8	3/8	3/8	3/8
1.5	1.5	3/8	3/8	3/8	3/8
2	2	3/8	1/2	1/2	1/2
2.5	2.5	3/8	1/2	1/2	1/2
3	3	1/2	1/2	1/2	1/2
4	4	1/2	5/8	5/8	5/8
5	5	1/2	5/8	5/8	5/8
6	6	1/2	5/8	5/8	5/8
8	8	5/8	7/8	7/8	7/8
10	10	5/8	7/8	7/8	7/8
13	13	7/8	7/8	7/8	7/8

DUAL CIRCUIT SYSTEMS

Unit Tonnage	Tons per Circuit	EQUIVALENT FEET 50	100	150	200
6	3	1/2	1/2	1/2	1/2
8	4	1/2	5/8	5/8	5/8
10	5	1/2	5/8	5/8	5/8
13	6.5	1/2	5/8	5/8	5/8
16	8	5/8	7/8	7/8	7/8
20	10	5/8	7/8	7/8	7/8
26	13	7/8	7/8	7/8	7/8
30	15	7/8	7/8	7/8	7/8

SUCTION LINES

SINGLE CIRCUIT SYSTEMS

Unit Tonnage	Tons per Circuit	EQUIVALENT FEET 50 HOR	50 VER	100 HOR	100 VER	150 HOR	150 VER	200 HOR	200 VER
1	1	7/8	7/8	7/8	7/8	7/8	7/8	7/8	7/8
1.5	1.5	7/8	7/8	7/8	7/8	7/8	7/8	7/8	7/8
2	2	7/8	7/8	7/8	7/8	7/8	7/8	1-1/8	7/8
2.5	2.5	7/8	7/8	7/8	7/8	7/8	7/8	1-1/8	7/8
3	3	7/8	7/8	1-1/8	7/8	1-1/8	7/8	1-1/8	7/8
4	4	1-1/8	1-1/8	1-1/8	1-1/8	1-1/8	1-1/8	1-3/8	1-1/8
5	5	1-1/8	1-1/8	1-1/8	1-1/8	1-3/8	1-1/8	1-3/8	1-1/8
6	6	1-1/8	1-1/8	1-3/8	1-1/8	1-3/8	1-1/8	1-5/8	1-3/8
8	8	1-3/8	1-3/8	1-3/8	1-3/8	1-3/8	1-3/8	1-5/8	1-3/8
10	10	1-3/8	1-3/8	1-5/8	1-3/8	1-5/8	1-5/8	1-5/8	1-5/8
13	13	1-3/8	1-3/8	1-5/8	1-5/8	1-5/8	1-5/8	2-1/8	1-5/8

HOR = HORIZONTAL

VERT = VERTICAL

DUAL CIRCUIT SYSTEMS

Unit Tonnage	Tons per Circuit	EQUIVALENT FEET 50 HOR	50 VER	100 HOR	100 VER	150 HOR	150 VER	200 HOR	200 VER
6	3	7/8	7/8	1-1/8	7/8	1-1/8	7/8	1-1/8	7/8
8	4	1-1/8	1-1/8	1-1/8	1-1/8	1-1/8	1-1/8	1-3/8	1-1/8
10	5	1-1/8	1-1/8	1-1/8	1-1/8	1-3/8	1-1/8	1-3/8	1-1/8
13	6.5	1-1/8	1-1/8	1-3/8	1-1/8	1-3/8	1-1/8	1-5/8	1-3/8
16	8	1-3/8	1-3/8	1-3/8	1-3/8	1-3/8	1-3/8	1-5/8	1-3/8
20	10	1-3/8	1-3/8	1-5/8	1-3/8	1-5/8	1-5/8	1-5/8	1-5/8
26	13	1-3/8	1-3/8	1-5/8	1-5/8	1-5/8	1-5/8	2-1/8	1-5/8
30	15	1-5/8	1-3/8	1-5/8	1-5/8	2-1/8	1-5/8	2-1/8	1-5/8

Data Aire, Inc.

Monthly Maintenance Inspection Checklist

Model No._____ Serial No. _____
Prepared by: _____ Date: ___ / ___/ 200__

Air Filters
___ Check for restricted air flow

Blower Section
___ Blower wheel free of debris moves freely
___ Check belt tension and condition
___ Bearings in good condition
___ Check pulleys and motor mounts

Air Distribution Section
___ Check for restriction in grille(s)

Compressor
___ Check for leaks

Refrigeration Cycle/Section
___ Check crank case temperature

Air Cooled Condenser (if applicable)
___ Condenser coil clean
___ Motor Mounts tight
___ Motor fan bearings in good condition
___ Refrigeration lines properly supported

Water/Glycol Fluid Cooler (if applicable)
___ Water regulating valve function
___ Check for water/glycol leaks (piping area)

Glycol Pump(s)
___ Glycol leaks (pump area)
___ Pump operation
___ Auto air vent clean of mineral deposits

Condensate Drain and Pump (if applicable)
___ Check for water leaks
___ Check for restricted air flow
___ Pump operation

Steam Generating Humidifier
___ Check canister for deposits and water level
___ Check condition of steam hose and clamps

Electrical Panel
___ Check contactor operation
___ DAPII control panel operations

Equipment Runtimes

Blower	_____	hrs
Condenser	_____	hrs
Compressor	_____	hrs
Reheat	_____	hrs
Humidifier	_____	hrs
Dehumidification	_____	hrs
Energy Saver	_____	hrs

___ Reset all to read zero runtimes

Temperature/Humidity set at: ___° ___% RH

Notes: _____
_____
_____
_____
_____
_____
_____
_____
_____
_____

Data Aire, Inc.

Quarterly Maintenance Inspection Checklist

Model No. _____ Serial No. _____
Prepared by: _____ Date: ___ / ___/ 200__

Air Filters
- ____ Check for restricted air flow
- ____ Check filter differential switch
- ____ Wipe filter rack section clean

Blower Section
- ____ Blower wheel free of debris and moves freely
- ____ Check belt tension and condition
- ____ Bearings in good condition
- ____ Check air flow safety switch operation
- ____ Check pulleys and motor mounts

Air Distribution Section
- ____ Check for restriction in grille(s)

Compressor
- ____ Check for leaks

Refrigeration Cycle/Section
- ____ Check for moisture (site glass)
- ____ Check suction pressure
- ____ Check discharge pressure
- ____ Check hot gas bypass valve operation
- ____ Check thermostatic expansion valve operation
- ____ Check solenoid valve operation

Air Cooled Condenser (if applicable)
- ____ Condenser coil clean
- ____ Motor mounts tight
- ____ Motor fan bearings in good condition
- ____ Refrigeration lines properly supported
- ____ Heated receiver site

Water/Glycol Fluid Cooler (if applicable)
- ____ Water regulating valve function
- ____ Check solution _____%
- ____ Check for water/glycol leaks (piping area)
- ____ Water/Glycol flow switch operational

Glycol Pump(s)
- ____ Glycol leaks (pump area)
- ____ Pump operation
- ____ Auto air vent clean of mineral deposits

Condensate Drain and Pump (if applicable)
- ____ Check for water leaks and restricted flow
- ____ Pump operation

Steam Generating Humidifier
- ____ Check canister for deposits and water level
- ____ Check condition of steam hose and clamps
- ____ Check drain and fill valve for deposits

Reheat
- ____ Check reheat element(s) for dust
- ____ Check high limit switch operation

Electrical Panel
- ____ Check fuses
- ____ Check contactor operation
- ____ Check all electrical connections
- ____ Check operation sequence
- ____ Check calibration of change over thermostat (Energy Saver System Only)

Equipment Runtimes

Blower	_____	hrs
Condenser	_____	hrs
Compressor	_____	hrs
Reheat	_____	hrs
Humidifier	_____	hrs
Dehumidification	_____	hrs
Energy Saver	_____	hrs

____Reset all to read zero runtimes

Temperature/Humidity set at: _____° _____% RH

Notes: _____
_____
_____
_____
_____

Superheat and Suction Pressure Trouble Shooting Guide

Low Suction Pressure and High Superheat

1. Moisture, dirt, wax
2. Undersized valve*
3. High superheat adjustment
4. Gas charge condensation
5. Dead thermostatic element charge
6. Wrong thermostatic charge
7. Evaporator pressure drop - no external equalizer
8. External equalizer location
9. Restricted or capped external equalizer
10. Low refrigerant charge
11. Liquid line vapor
    a. Vertical lift
    b. High friction loss
    c. Long or small line
    d. Plugged drier or strainer
12. Low pressure drop across valve
    a. Same as #11 above
    b. Undersized distributor nozzle or circuits
    c. Low condensing temperature

High Suction Pressure - Low Superheat

1. Oversized valve*
2. TEV seat leak
3. Low superheat adjustment
4. Bulb installation
    a. Poor thermal contact
    b. Warm location
5. Wrong thermostatic charge
6. Bad compressor - low capacity
7. Moisture, dirt, wax
8. Incorrectly located external equalizer

Low Suction Pressure - Low Superheat

1. Low load
    a. Not enough air
    b. Dirty air filters
    c. Coil icing
2. Poor air distribution
3. Poor refrigerant distribution
4. Improper compressor-evaporator balance
5. Evaporator oil logged
6. Flow from one TEV affecting another’s bulb

* Data Aire has ensured that valves are size properly as the unit ships from the factory.

Temperature Pressure Chart
for R-22 and R-407C

Temperature	R-22 Pressure, PSI	R-407C Pressure, PSI
26	50.0	43.6
27	51.2	
28	52.4	46.0
29	53.7	
30	54.9	48.4
31	56.2	
32	57.5	50.9
33	58.8	
34	60.2	53.5
35	61.5	
36	62.9	56.2
37	64.3	
38	65.7	58.9
39	67.1	
40	68.6	51.7
41	70.0	
42	71.5	64.6
43	73.0	
44	74.5	67.6
45	76.1	
46	77.6	70.7
47	79.2	
48	80.8	73.8
49	82.4	

Temperature	R-22 Pressure, PSI	R-407C Pressure, PSI
50	84.1	77.1
55	92.6	106.0
60	101.6	116.0
65	111.3	127.0
70	121.5	139.0
75	132.2	151.0
80	143.7	163.0
85	155.7	177.0
90	168.4	191.0
95	181.9	206.0
100	196.0	222.0
105	210.8	239.0
110	226.4	257.0
115	242.8	275.0
120	260.0	294.0
125	278.1	315.0
130	297.0	336.0
135	316.7	358.0
140	337.4	381.0
145	359.1	405.0
150	381.7	430.0

Pressure-Pounds per Square inch gauge - standard type

A

Air Cooled Systems 7, 8, 10, 20
Air Filters 27
Air Vents 12
Ambient Thermostats 18
Auxiliary Wiring 15

B

Bearings 27
Belts 27

C

Charging
- Air Cooled Fan Speed Systems 20
- Air Cooled Flooded Systems 21
- Air Cooled Split Systems 19
- Air Cooled Packaged Systems 19
- Flooded Systems 21
- Water/Glycol Systems 22

Coils
- Auxiliary Chilled Water 13
- Condenser 21,22
- Evaporator 11, 12
- Fluid Cooler 18, 24, 25, 26
- Volume see Volume

Compressors
- Crankcase Heaters 19, 20, 21, 22
- Fan Motor 7
- Manual Bypass/Override

Condensate Pumps 8, 13
Condensers ... 10 ,11, 15, 17, 19, 20, 21, 25
Condenser Fan Section 7
Condensing Units 10, 11, 15, 17
Connection Sizes
- Air Cooled Units 10
- Fluid Coolers 13
- Water/Glycol Cooled Units 13

Contact Data Aire 30
Controls
- Mini DAP II Control Panel . 15, 16, 25,27
- Mini DAP III Control Panel 16, 25, 27
- Wiring Diagrams 26

Crankcase Heaters 19, 20, 21, 22

D

Differential Pressure Switch 27
Discharge Lines 10
Ducting 8

E

Electrical
- Evaporator 15, 16
- Outdoor Heat Exchanger 17

Energy Saver 18
Expansion Valve 23
Expansion Tank 12
Evaporator 7, 8, 12, 13, 18, 19, 24

F

Fan Speed Control Systems 17, 20, 21
Field Piping
- Air Cooled 10, 11
- Auxiliary Chilled Water 13
- Condensate 13
- Condenser 11
- Condensing Unit 11
- Fluid Cooler 12, 24
- Glycol Cooled 12, 13, 24
- Steam Generator Humidifier 14
- Water Cooled 12, 13

Field Wiring
- Remote Alarm Contacts 16
- Remote Condenser 15
- Remote Condensing Unit 15
- Remote Fluid Cooler 15
- Remote Sensors 16
- Remote Shutdown 16

Filter
- Air 27
- Drier 28
- Differential Pressure Switch 27

Flooded Systems 21
Flow Switch 12
Fluid Coolers 13, 15, 17, 18
Fluid Sensing Thermostats 18
Freezing Point, Aqueous Solutions 24
Fuses 27

G

Glycol Concentration 24
Glycol Systems 12, 13, 24
Grounding 15

H

Head Pressure 19, 21, 22
- Control Valve 21
- Cutout Switch 23
- Water Regulating Valve 22

Heat
- Crankcase ..... 19, 20, 21 ,22
- Electric 28
- Reheat Elements 28

High Pressure Cutout Switch 23
Horizontal Units 8
Humidifier
- Canister 27

Humidifier *(continued)*
Dry Steam Humidifier
Steam Generator Humidifier 14

I

Inspection 6
Installation 6
Internal Volume see Volume

L

Liquid Lines 10, 11, 31
Leak Testing 14
Locating
Evaporator 6
Secondary Heat Exchanger 17
Low Pressure Cutout Switch 23

M

Maintenance
Bearings 27
Belts 27
Filters 27
Fuses 27
Heating Elements 28
Humidifier Canisters 27
Refrigerant Filter Drier 28

P

Packaged Unit 7
Paperwork 8
Piping See *Field Piping*
Plenum Supply Return 7
Pumps
Centrifugal 12
Condensate 13

R

Receivers 21
Recovery 23
Refrigerant 10, 14, 19, 20, 21, 22, 23, 29
Charge see *Charging*
Handling 23
Recovery 23
Reheat
Elements 27
Electric 27
Remote
Alarm Contacts 16
Condensers 17
Condensing Units 17
Fluid Coolers 18
Sensors 16
Remote Shutdown 16
Rigging 17

S

Sight Glass 19, 20, 21
Start Up Sheet 8
Strainer 12
Subcooling 20, 21, 22
Suction Lines 10, 11,19, 20, 21, 22, 31
Superheat 19, 20, 21, 22, 34

T

Thermo-expansion Valve (TXV) 23
Thermostats
Ambient 18
Fluid Sensing 18
Programmable 25
Traps 10, 11, 13

V

Valves
Head Pressure Control 21
Humidifier Makeup Water 14
Shutoff 12
Water Regulating 22
Vertical Airflow Units 7
Voltage
Phase Check 15
Volume
Copper Piping 24
Fluid Coolers 24
Internal Fluid 24

W

Warranty 8, 29
Wiring 15, 16, 26

Z

Zirk Fittings 27

Notes:

230 W. BlueRidge Avenue
Orange, CA 92865
800-347-2473

www.dataaire.com e-mail: sales@dataaire.com

A Member of the CS Group of Companies

© 2009 Data Aire, Inc.

Data Aire, Inc. reserves the right to make design changes for the purpose of product improvement or to withdraw any design without notice.

DAMxIOM-0209